http://bit.ly/autismtech

http://bit.ly/appsforlearning

AUTISM LEARNING TECHNOLOGIES:

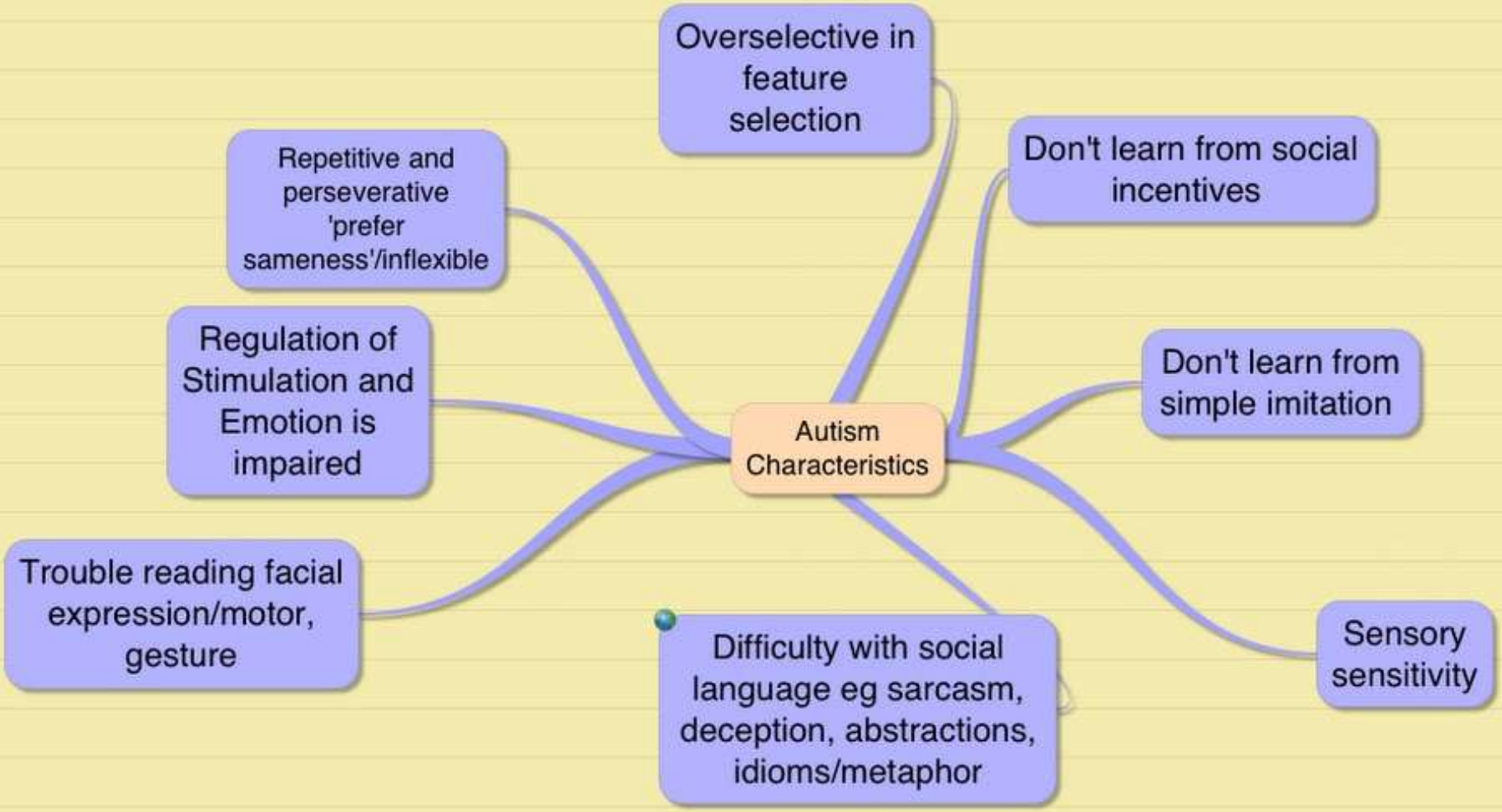
Pathways to Expression and Engagement

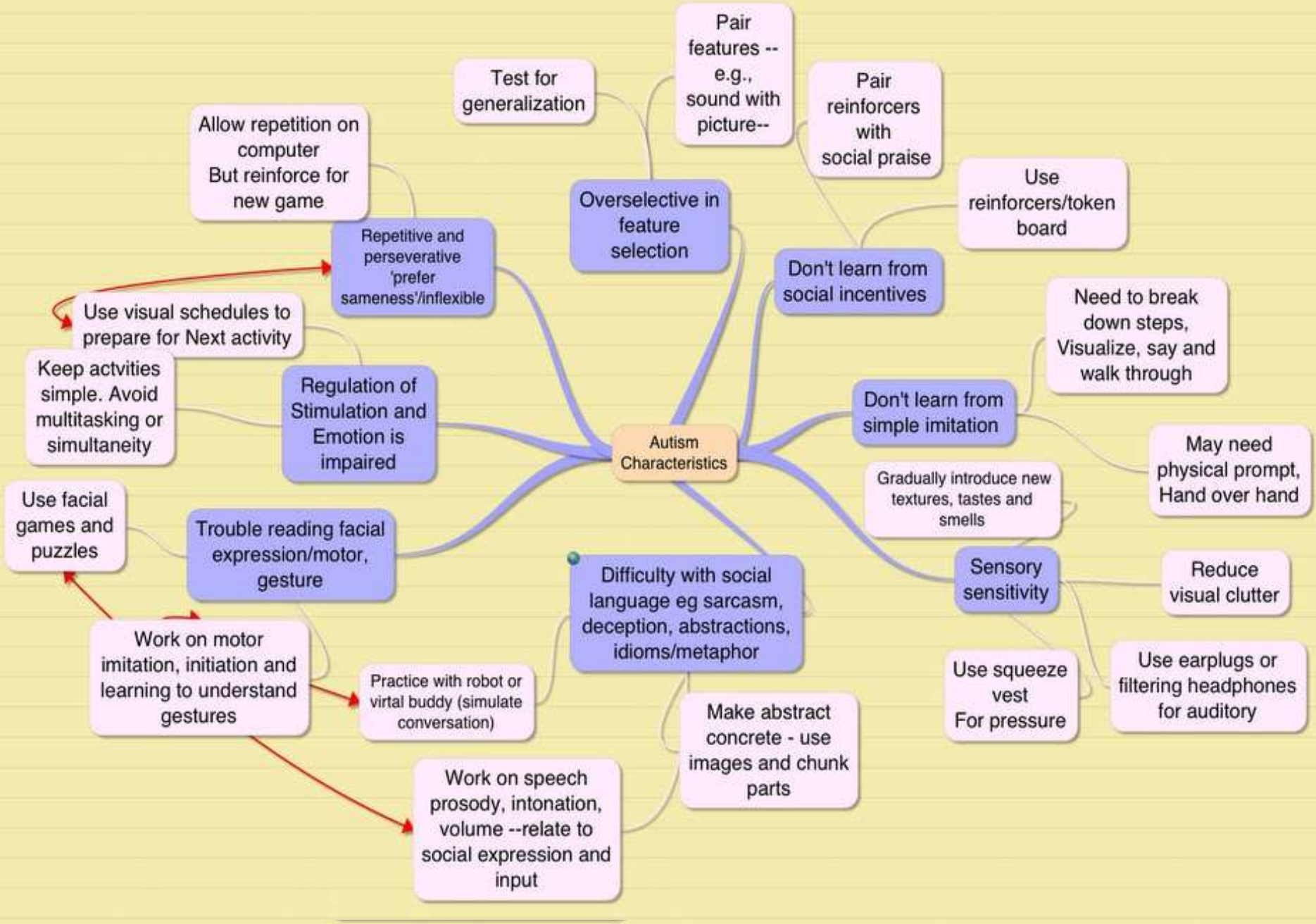
SCATN Workshop
Columbia, South Carolina
June 9, 2012

http://bit.ly/appsforautism

Katharina Boser, Ph.D.

Autism Features




Autism Characteristics
Overselective in feature selection
Test for generalization
Pair features -- e.g., sound with picture--
Don't learn from social incentives
Pair reinforcers with social praise
Use reinforcers/token board
Repetitive and perseverative 'prefer sameness'/inflexible
Allow repetition on computer But reinforce for new game
Regulation of Stimulation and Emotion is impaired
Use visual schedules to prepare for Next activity
Keep actvities simple. Avoid multitasking or simultaneity
Trouble reading facial expression/motor, gesture
Use facial games and puzzles
Work on motor imitation, initiation and learning to understand gestures
Practice with robot or virtal buddy (simulate conversation)
Work on speech prosody, intonation, volume --relate to social expression and input
Difficulty with social language eg sarcasm, deception, abstractions, idioms/metaphor
Make abstract concrete - use images and chunk parts
Don't learn from simple imitation
Need to break down steps, Visualize, say and walk through
May need physical prompt, Hand over hand
Sensory sensitivity
Gradually introduce new textures, tastes and smells
Reduce visual clutter
Use earplugs or filtering headphones for auditory
Use squeeze vest For pressure

Best Practices: Behavioral Treatment

- **A**pplied **B**ehavioral **A**nalysis (ABA)
  - Discrete Trial Training (DTT, Lovaas, Smith)
- **P**ivotal **R**esponse **T**raining (PRT, Koegel, Schreibman)
- **T**reatment and **E**ducation of **A**utistic and related **C**ommunication handicapped **C**hildren (TEACCH, Mesibov, Schopler)
- Developmental Denver Model (Dawson, Rogers)
- **D**evelopmental **I**ndividual **R**elationship-based. (DIR, Greenspan)
- **P**icture **E**xchange **C**ommunication **S**ystem (PECS, Bondy & Frost)

- (see Myers et al. AAP paper for research citations and Autism Speaks website for instructional videos/details on method)

Why Technology?

- **Assessment and Data sharing**
  - More objective assessment; reduced "observer effects"
  - Allows observation in more natural settings
  - Increases amount and therefore validity of data
  - Cloud technology/internet allows all team members to view data
- **Multimedia Components;**
  - Visuals reduce anxiety, allow choice, schedule, timers
  - Audio, video increase understanding through symbols/pictures
- **Bridge to interaction, attention and social engagement**
  - Students more comfortable with structure of computing/tech (Moore & Calvert, 2002, Bernard-Opitz, et al 2001)
  - Development of generalization and opportunity to 'practice' interactions with normal peers 'virtually'.
- **Motivation:** Very engaging--fun factor
  - 21st century skill development

The "What/Who" of Technology

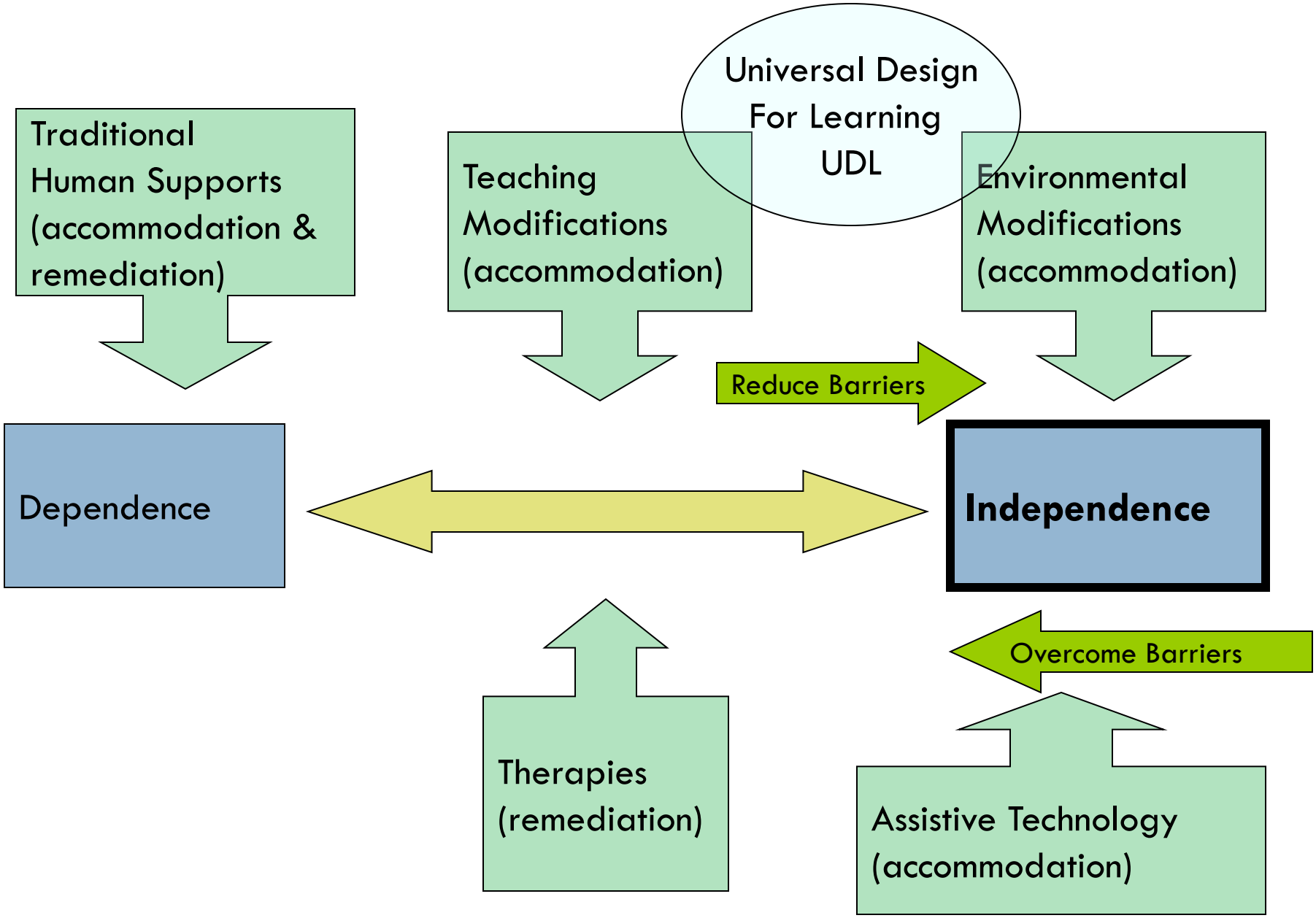
- For the **Student:**
  - Language/Communication
  - Cognition and Memory; Skill Acquisition
  - Emotion Recognition and Regulation
  - Social Skills, e.g., joint attention, turn taking
- For the **Clinician, Parent or Teacher:**
  - Data collection, analysis
  - Explicit Teaching methods
  - Ease and cost of presentation of stimuli and re-creation of environments

Methodological Issues

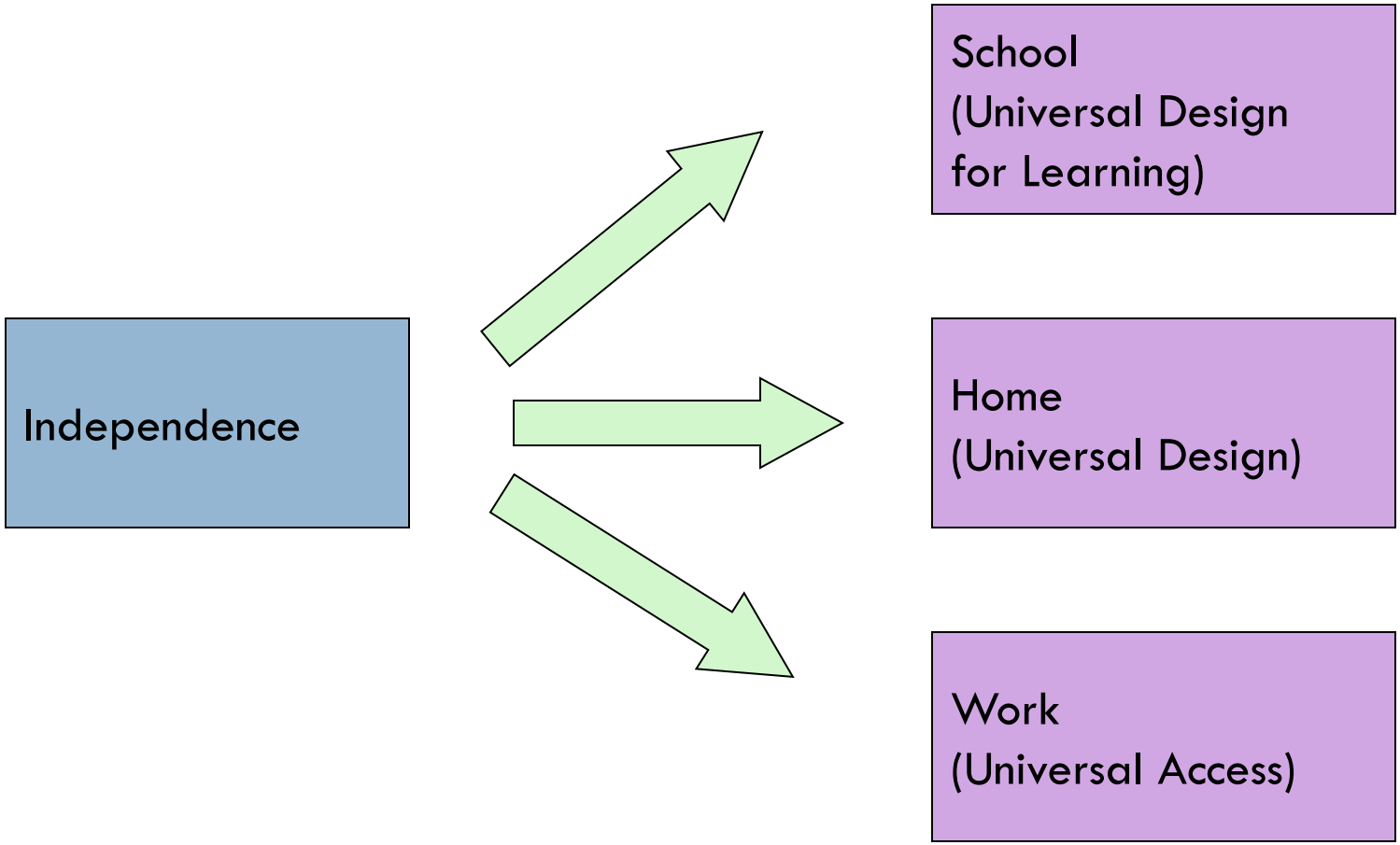
- Innovative technology research is in infancy
  - Control groups (RCT) vs. individual case
  - Ethics of control treatment or not the 'best treatment' for control subjects
  - How to match controls (for low verbal and other heterogeneous groups)
  - See recent Pennington 2010 paper in JADD
- Different questions being asked:
  - Is it better than alternative or current intervention?
  - Is it feasible? Does it work?
  - Are they more engaged? Perform longer?

Overview of Presentation Areas

- Best Practices in Autism Treatment
- Autism Technologies--Beyond Computers—Web 2.0 , Data sharing/use
  - **U**niversal **D**esign for **L**earning—21st Century Learning
  - Synching/Presenting Data-Symtrend, Vizzle, Teachtown
  - Graphing emotion regulation-Symtrend
  - Ipads/mobile devices
- Behavior Management, Timers, Choice, Schedules
- Language Skills, Reading, and Writing
- Computing for Social Navigation
  - Shared Surfaces Forced Collaboration
  - Virtual Worlds for Social Engagement
  - Secret Agent Society, Face Say
- Demo and Review of Themes

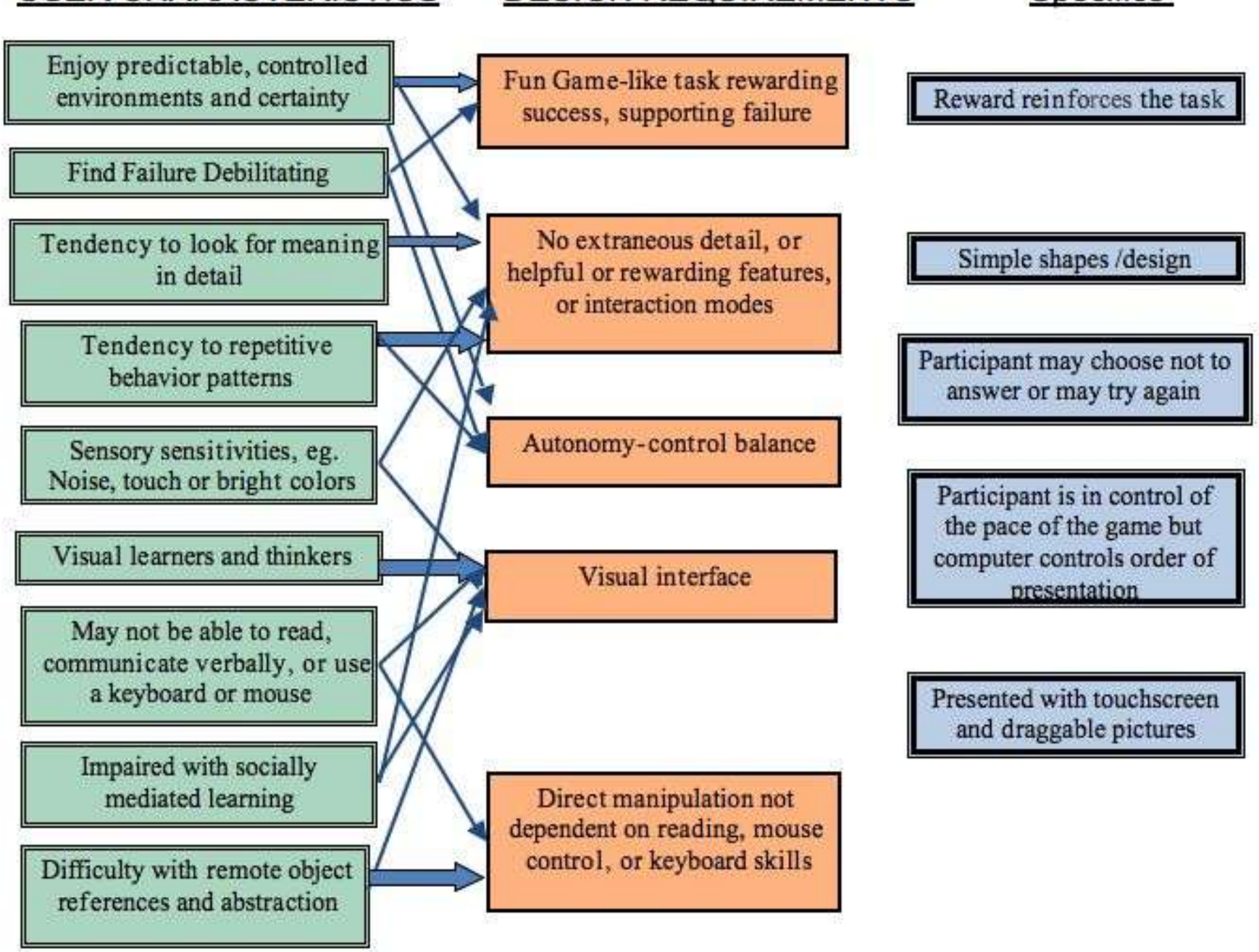


Assistive Technology is uniquely designed for the individual;
IEP and special services will still be needed under UDL curriculum


Independence
School
(Universal Design
for Learning)
Home
(Universal Design)
Work
(Universal Access)

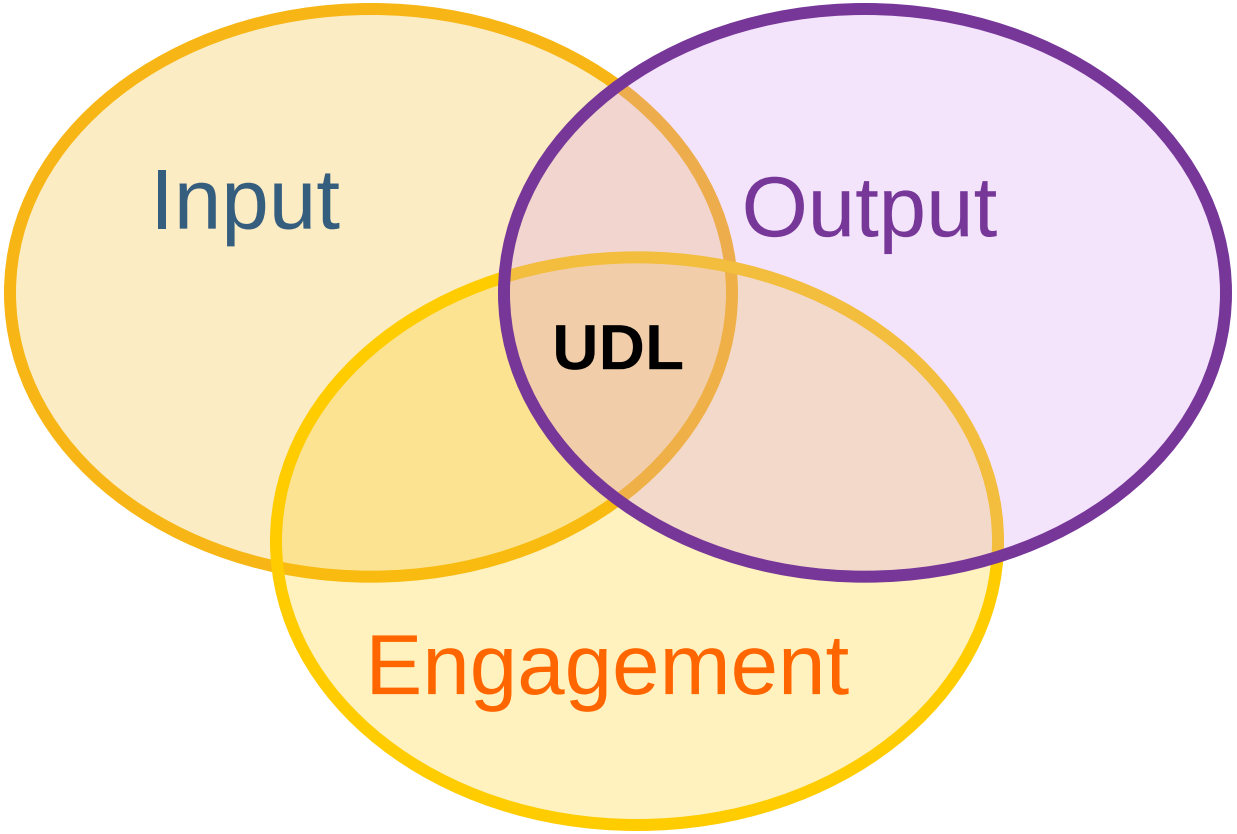
Accommodations must be Individualized

- Each person has unique set of weaknesses
- Each person has unique set of strengths
- Obligation to create technology that people will use
  - Headstick
  - Alphasmart, Dynavox
  - Ipad or tablet with visual/audio



From Dautenhahm et al, 2010

Learning Networks



All work simultaneously.

National Technology Integration Plan 2010

http://www.cast.org/publications/UDLguidelines/version1.html

Universal Design for Learning

Recognition: Input

- Different modes of perception
- Different ways to present language
- Different ways to present concepts

Expression: Output

- Provide organizational support
- Allow different modes of expression
- Encourage physical action

Engagement

- Create interest
- Sustain effort & persistence
- Help with self-regulation

How to implement?

http://www.fdlrs.org/docs/ent2010web.pdf
Http://udltechtoolkit.wikispaces.com

http://www.fdlrs.org/docs/ent2010web.pdf

Connecting Brain Research and Universal Design for Learning (UDL)

The **WHAT** of Learning

The **HOW** of Learning

The **WHY** of Learning

Recognition Network

Student: *Making Connections, Long Term Memory, Ideas*
Teacher: *Uses Multiple and Flexible Means of* ***Presenting*** *what is to be Learned*

INPUT

Expression/ Strategic Network

Student: *Planning, Regulating and Executing Action for Output*
Teacher: *Allows Multiple and Flexible Means of* ***Demonstrating*** *what was Learned*

OUTPUT

Affective Network

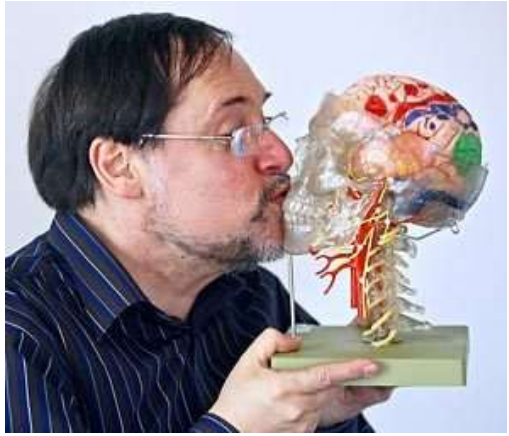
Student: *Connecting Emotionally, Providing Purpose*
Teacher: *Uses Multiple and Flexible Means of* ***Engaging*** *the learner in what is to be Learned*

ENGAGEMENT

The archeology of human learning. Learning requires:

- Movement
- Challenge and frustration--exploration
- Emotional arousal
- Resource state access (to remember and have confidence for the journey)
- Repetition
- Adequate sleep
- A sense of being in control
- Multisensory stimulation
- Lots of pictures

Dr. John Medina "Brain Rules"



Cloud Based Technology

Connecting the Educator, Student and Parent!

- Global access by all involved
- Allows for a teacher or parent to share/view or collaborate on documents
- Allows different levels of user access to data/activities (teacher, parent, student, etc.)
- Secure Data protection on server
- Allows time to compose and think
- Learning at unconventional times

The Cloud

EVERNOTE

drigo V5.0 beta

Dropbox

Best Apps and services for storing information 'free' :
Dropbox, Evernote, Google Drive

TOOLS that support Data Sharing

Vizzle

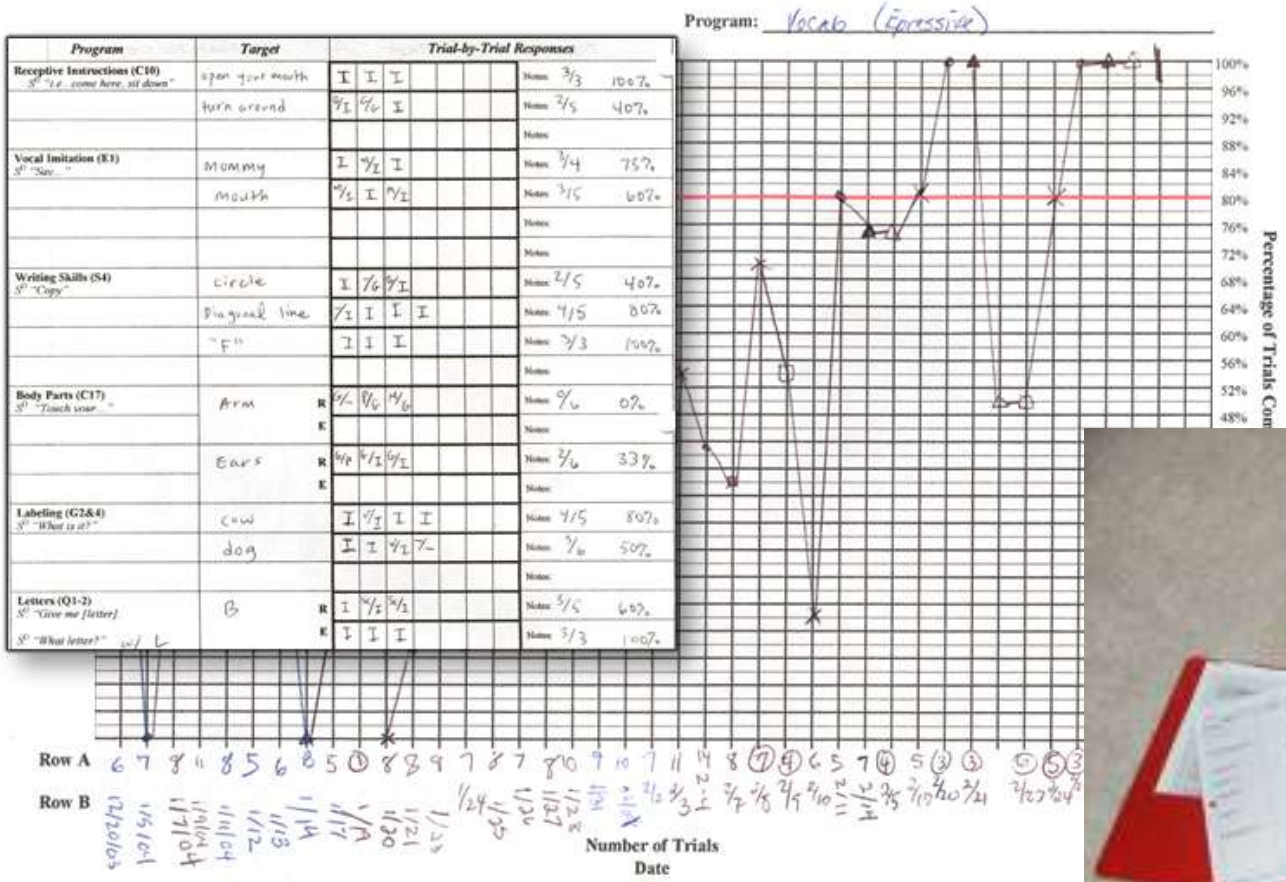
Symtrend

Teachtown

Discrete Trial Training Therapy

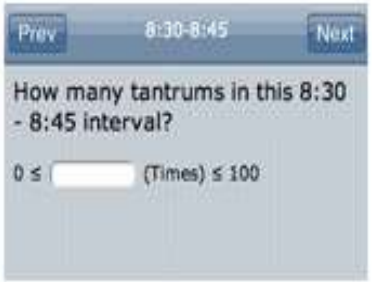
- Team of therapists teach basic life skills
  - e.g. Word pronunciation
- One-on-one setting with one therapist and child
- Many repeated trials with a specific protocol:
  - Each trial starts with an exact, spoken command
    - e.g. “Say school bus”
  - Each trial ends with a written grade
    - e.g. Grade “I” means child said “school bus” independently
- Very data-intensive
  - Current system is paper-based and time consuming

Discrete Trial typically involves taking Data on Paper



Symtrend:
ABC and FBA

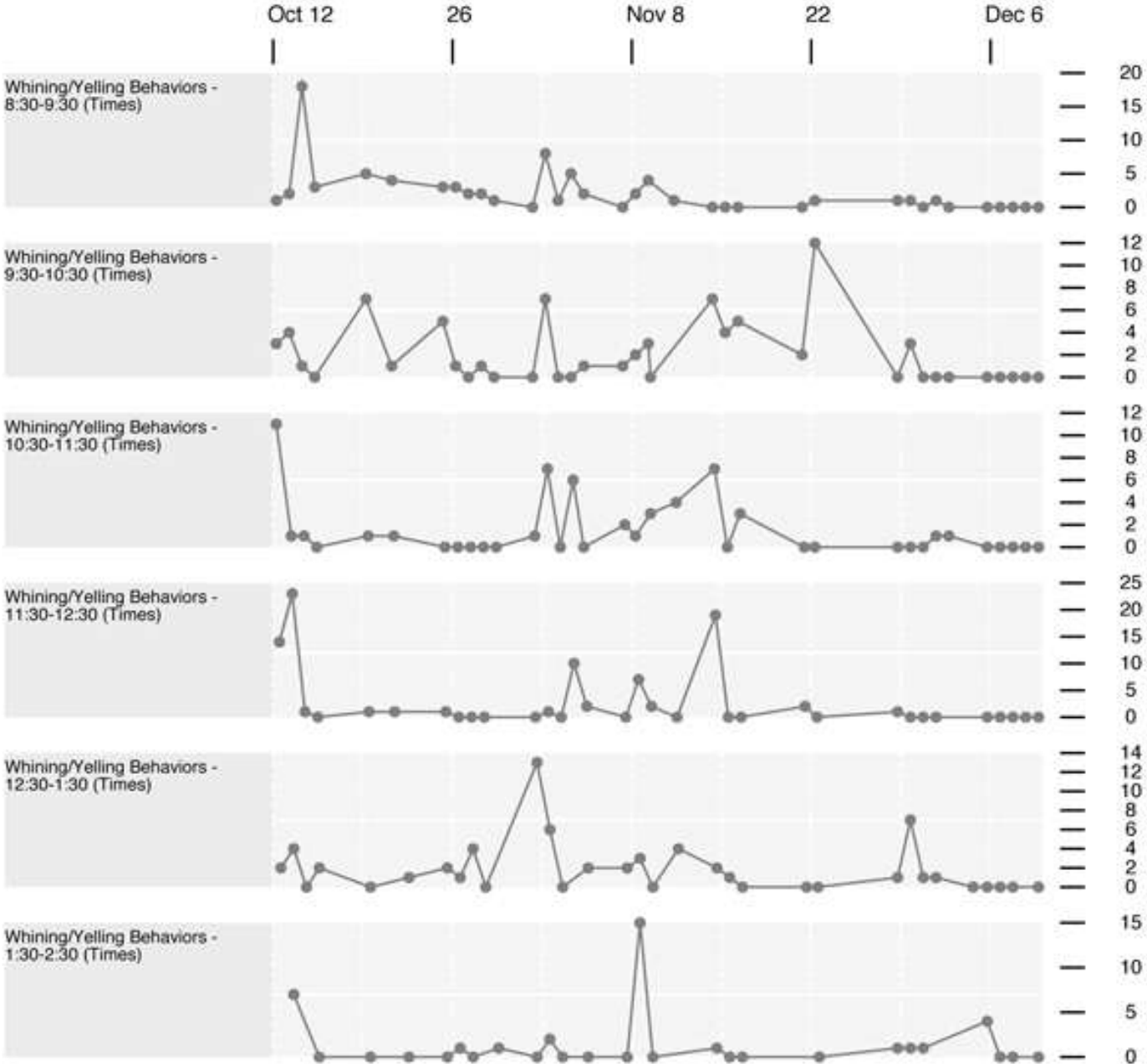
OR



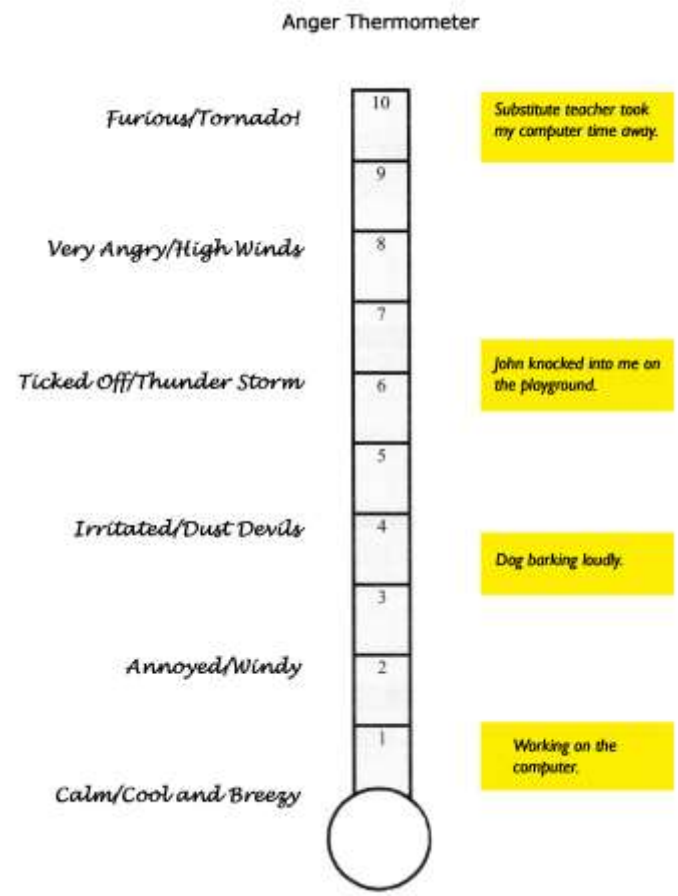
Date	Negative Behaviors During 12:00 - 12:30	Negative Behaviors During 12:30-1:00	Negative Behaviors During 1:00-1:30	Negative Behaviors During 1:30-2:00	Negative Behaviors During 2:00-2:30
2011-02-03 13:30 Thu	Banging/throwing objects Crying/screaming				
2011-02-03 14:30 Thu					Bolting/eloping Crying/screaming
2011-02-04 11:45 Fri		Making noises			
2011-02-04 14:30 Fri				Making noises	
2011-02-04					

http://symtrend.com

Symtrend FBA Graphs

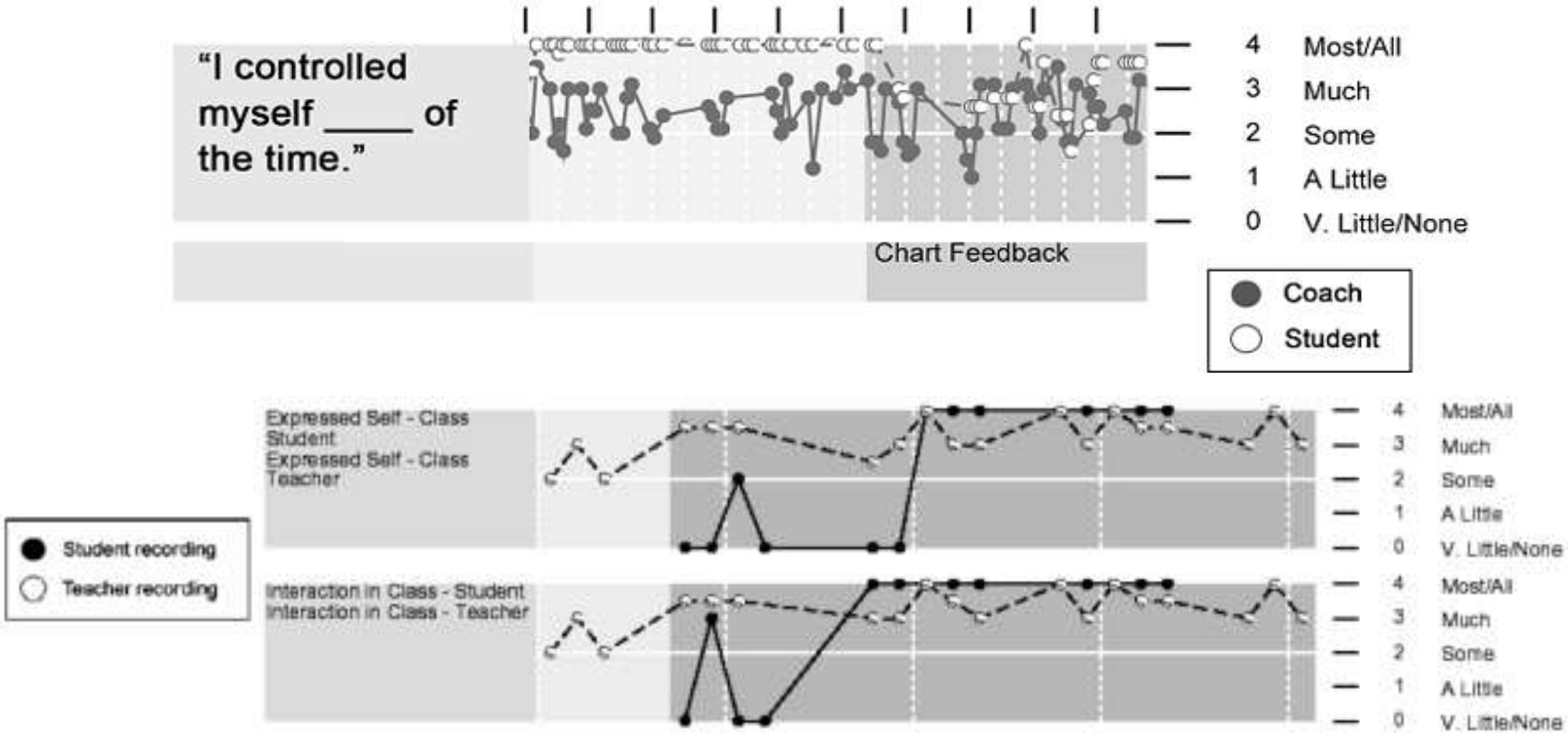


Symtrend: for CBT intervention



In collaboration with MGH Youth Care program, Lucci, McLeod et al IMFAR 2010

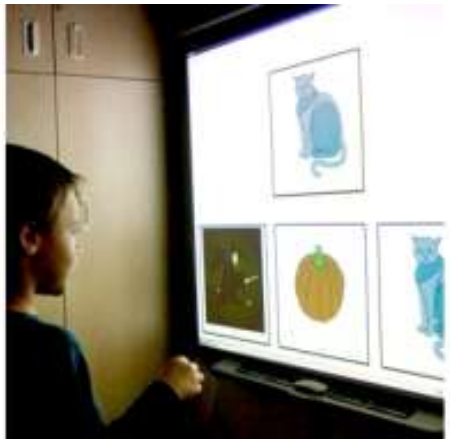
Graphing Emotion Regulation



After training, students and teacher converge more on ability to record expression and interaction; More in synch with coaching and viewing graphs together

Visual Language

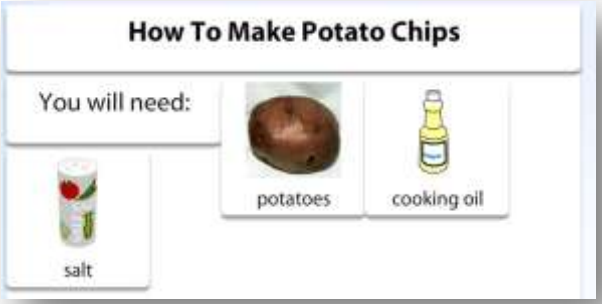
- http://vizzle.com



- Research studies by Howard Shane & Kevin Kearns (Boston Children's Hospital) and Monarch school demonstrate efficacy-unpublished
- Access to web based moderated curricula
- Includes video, audio, text insertion
- See also Teaching Language Concepts at BCH

vizZle
visual learning

Scheduler



Teach
Play Back and Organize Lessons

→

Create
Design and Save Lessons

→

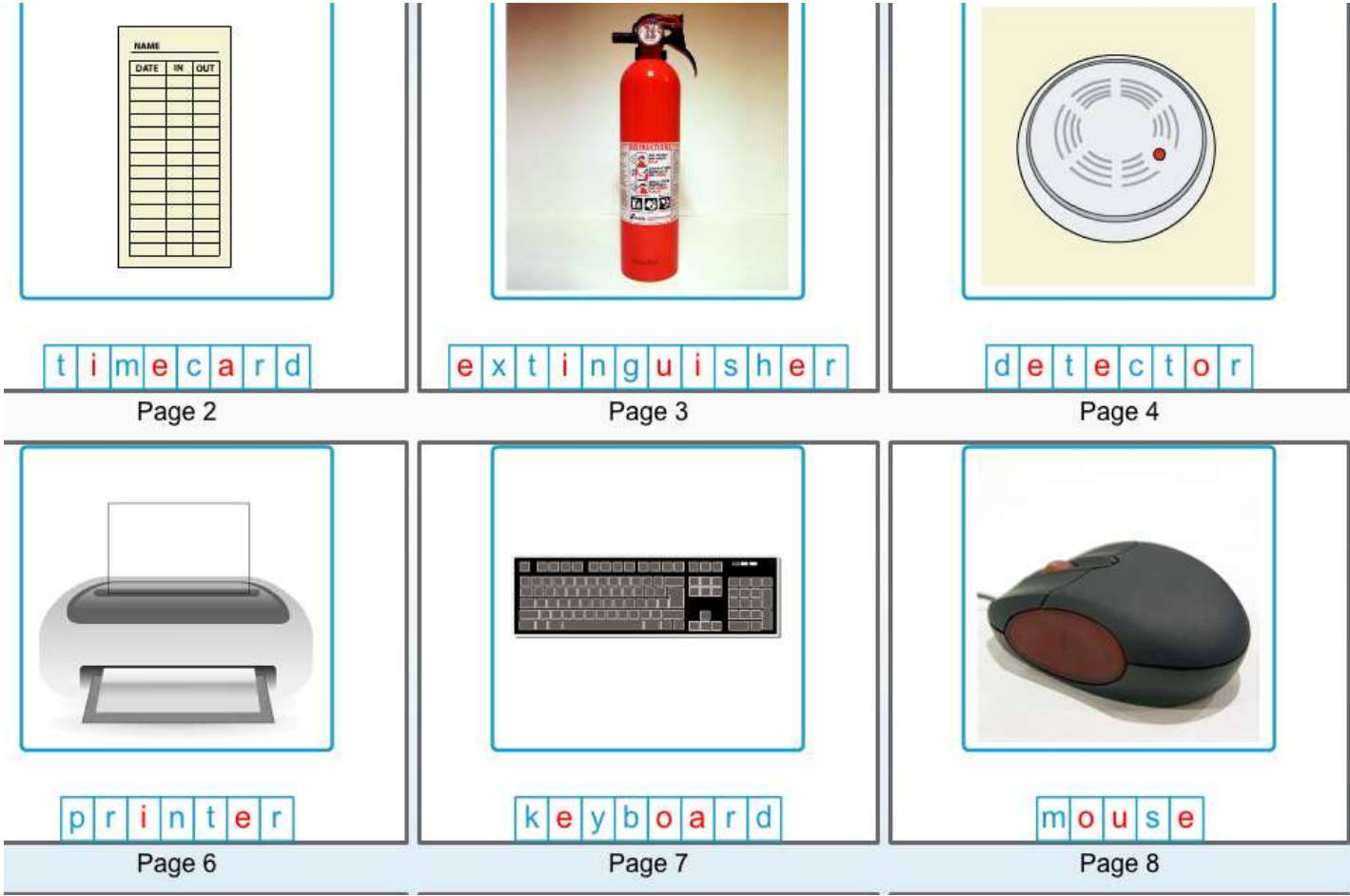
Share
Search For Shared Lessons

Drag and Drop Visual Templates:

- Matching
- Build-A-Book
- Game
- Sorting
- Phonics +
- Pix2Go
- Scheduler
- Token-Board
- Timer
- First Then

Phonics+

- Interactive Visual Supports for
  - Phonemic Awareness
  - Phonics
  - Spelling
  - Fluency



Scalable Student Manager

Chrome File Edit View History Bookmarks Window Help (100%) Tue 8:17 PM

Joyce Whitby wants to share | Effective educational softwa | Monarchteachtech.com - Ca | Home - Google Docs | VizZle

www.govizzle.com/vizzle/#vizzle

vizzle Create Teach Share Help bat Logout

My Folders
- My Vizzle
  - My Tools
  - My Media
  - My Lessons
  - Al D
  - Billy B
  - Harold A
  - Jack F
  - Justin C
  - Louie W
  - Roy M
  - Teq T
  - Magic Media
  - Search Results
  - Clipboard
  - Recycle Bin

My Profile

First Name Joyce

Last Name Whitby

Change Password

First Name	Last Name	Date Added
Mary	Mouse	Mon Apr 9 10:52:45 GMT-0400 2012
Kate	Moe	Thu Apr 5 14:33:21 GMT-0400 2012
Dee	Dee	Mon Apr 2 11:48:24 GMT-0400 2012
Ann Mary	smith	Wed Mar 28 13:16:20 GMT-0400 2012
alice	joyce	Wed Mar 28 13:07:38 GMT-0400 2012
Either	Jimmy	Wed Mar 28 13:07:02 GMT-0400 2012
lee ray	Thomas	Tue Mar 27 10:35:22 GMT-0400 2012
holiie	smith	Tue Mar 27 10:33:07 GMT-0400 2012
Jab	Jore	Fri Mar 23 09:12:38 GMT-0400 2012
teggra	woods	Fri Mar 23 09:12:14 GMT-0400 2012
Jon	Doe	Thu Mar 22 15:41:57 GMT-0400 2012

Move Checked

Move Checked

	First Name	Last Name
☐	Teq	Teq
☐	Roy	Mann
☐	Jack	Frost
☐	Louie	Whitby
☐	Al	Dente
☐	Justin	Case
☐	Harold	Angel
☐	Billy	Bob

dent

First Name Harold

Username harolda

Last Name Angel

Teachers Joyce Whitby, Stacey Clemence, Stacey Clemence

Edit Student Details / Student Password

Keeping Data Real !!!

Chrome File Edit View History Bookmarks Window Help (100%) Tue 8:21 PM

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www.govizzle.com/vizzle/#vizzle

vizzle Create Teach Share Help Search Logout

My Folders
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  - My Lessons
- Al D
- Billy B
- Harold
  - Too
  - Me
  - Les
  - Sha
- Jack P
- Justin
- Louie
- Roy M

Harold

Zoom

Profile | Data | Goal Creator

Harold 's Data

Displaying data from: **IEP Objectives:** Correctly identify prepositions in representational format (generalized), Color Match, Interpret the structure of expressions, Identifying Characters, Write expressions in

Harold 's Data

Displaying data from: **IEP Objectives:** Correctly identify prepositions in representational format (generalized), Color Match, Interpret the structure of expressions, Identifying Cha
equivalent forms to solve problems, Identifying Details, Identifying Location/Setting

<< Back

Percentage Cor...	# Correct	# Incorrect	# of Questions	Date	Lesson ID	Lesson Name	Total Time in min...
0	0	0	0	2011-10-04	18400	Leo's Prepositions	0.6
0	0	7	7	2011-10-04	9886	Leprechaun Prepositions	0.7
8	1	11	12	2011-10-04	33400	"In" or "On" - Dolly & the Train	1.3
33	4	8	12	2011-10-04	33400	"In" or "On" - Dolly & the Train	6.1
80	4	1	5	2011-10-06	48485	Johny's Color Match	1.9
71	5	2	7	2012-01-06	78560	Find the Character (Wisharoo)	0.5
71	5	2	7	2012-01-06	78560	Find the Character (Wisharoo)	0.7
100	5	0	5	2012-03-29	131865	I did a great job example	0.4

Export

Language, Academic, Social

TeachTown®: Basics

Special Needs / Autism

- Results show p > .0001 level difference from pre to post tests –
  - All treatment group students (n=15) mastered an average of 5-6 lessons (20-24 concepts/targets) (Whalen et al, 2010)
  - Preschool 43 minutes to mastery
  - K/1 students 52 minutes.
- More use led to more lessons mastered (p<.05) and better on the Brigance (p,.05).

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http://web.teachtown.com/research/studies

IPad and IPod

Mobile apps for apple are much more prevalent.

Some are available cross platform (Android) Mostly read books and a few autism apps

https://www.youtube.com/watch?v=GEqV_8ahr90&feature=youtube_gdata_player

calculate listen research

share

create observe

watch

convince

synthesize

enhance learn

write

infer communicate

visualize

debate

explore

analyze

read

experience

predict

manipulate express

assist

organize

formulate

Tools & Resources

Tools & Resources

...that fit in your pocket.

What makes the iPad a good learning tool?

- Multimedia components: Highly Visual, links with auditory

- Tactile stimulation, ease of use and touch

- Movement and 'construction'

- Engaging and Fun; motivation/reward

http://bit.ly/appsforautism

iPad is

Know your iPad

- Ipad Users Guide (free ibook on apple.com)
- App start (ipad 101) or Autism Apps
- Understand itunes and itunesU
- Know your app developers:
  - *Be sure they are connected with the community and not just creating a 'one-off' app*
  - *Connect with (itaalk.org, momswithapps, snapps, etc) where developers give 'freebies' and listen to feedback, changes are made*

App start

- Often better apps result from originally designed tool for desktop
  - *components are converted for mobile use*
  - *E.g, Vizzle, nuance, starfall,*

Autism apps

CRITICAL EVALUATION OF AN IPAD/IPOD APP

©2011. Kathleen Schrock (kathy@kathyschrock.net)

iPads in the Classroom site: http://linkyy.com/ipad

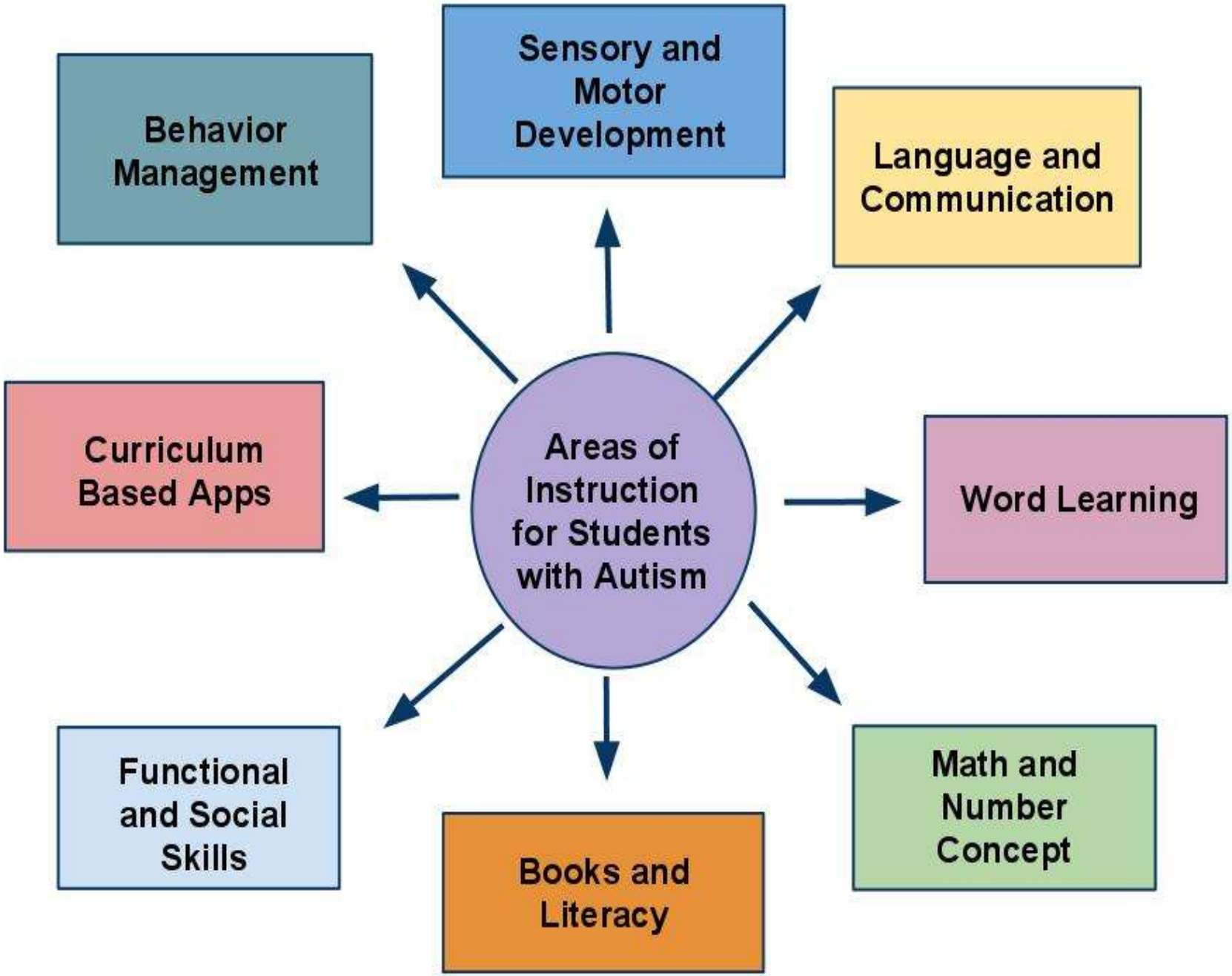
What is the title of the app? _____ Cost: _____

Creator of the app _____ iTunes URL: _____

Content area(s): _____ Grade level: _____

Content and components of the app	YES	NO
Curriculum connection: Are the skills reinforced connected to targeted skill/concept?		
Authenticity: Are skills practiced in an authentic format/problem-based environment?		
Feedback: Is feedback specific and result in improved student performance?		
Differentiation: Does the app offers flexibility to alter settings to meet student needs?		
User friendliness: Can students can launch and navigate within the app independently?		
Student motivation: Are students motivated to use the app and select it to use often?		
Reporting: Is assessment/summary data available electronically to the student/teacher?		
Sound: Does the music/sound in the app add to the educational aspects of the content?		
Instructions: Are the instructions included within the app helpful to the student?		
Support page: Does the app's supporting Web page provide additional useful information?		

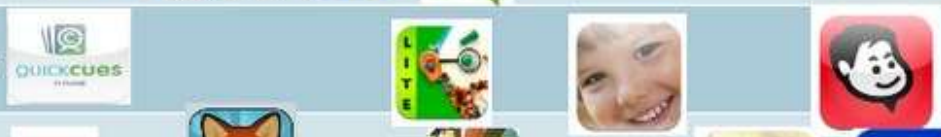
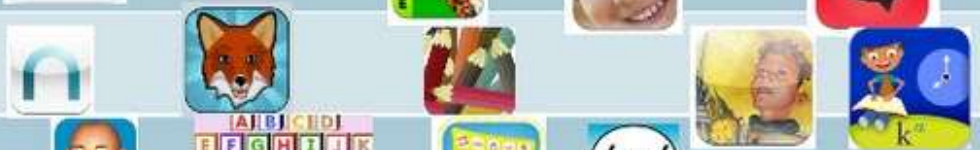
Summary of the app
Using the data you have collected above, explain why you would or would not recommend this application for use in the classroom. Include any specific ideas you have for its use.



http://bit.ly/appsforautism

iPad 12:54 PM 97%
Google Search appslpad

Areas for Instruction Matched with Apps

Behavior Management	
Organization/ Writing Apps	
Sensory and Motor Development	
Language and Communication	
Functional and Social Skills	
Books and Literacy	
Word Learning	
Math and Number Concepts	

From http://bit.ly/appsforautism

Google docs Slide 1 of 16 Actions https://docs.google.com/present/view?id=dsbrzd2_469gtzsczz2 View together

Behavior Managment

Motivation, data, choice boards, timers

And social tools

Behavior Management Tools

Behavior Trackers

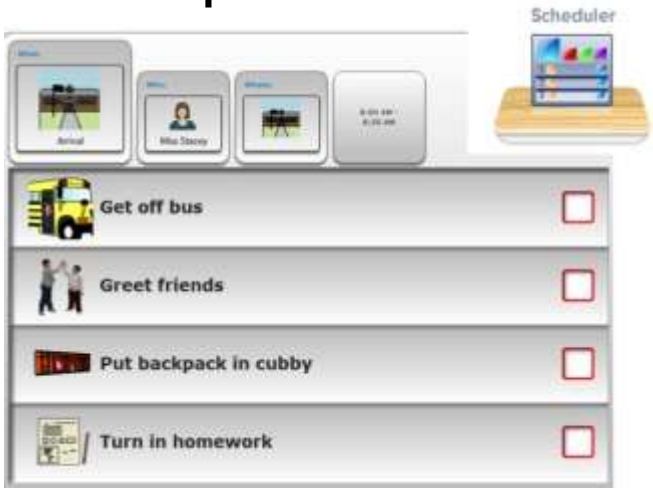
- Symtrend, Behavior Tracker Pro

ABA Apps

- Built in feedback, intense structure learning and rewards to increase positive behaviors from one situation to another

Behavior Management Tools
Schedulers , Choice Boards and Timers

- Dealing with short attention span
  - Tasks are broken down into smaller pieces
  - Rewards for performance
- Instruction is clear and consistent, simple and concrete
- Information is represented visually



Reading, Writing, Story Telling and Literacy Tools

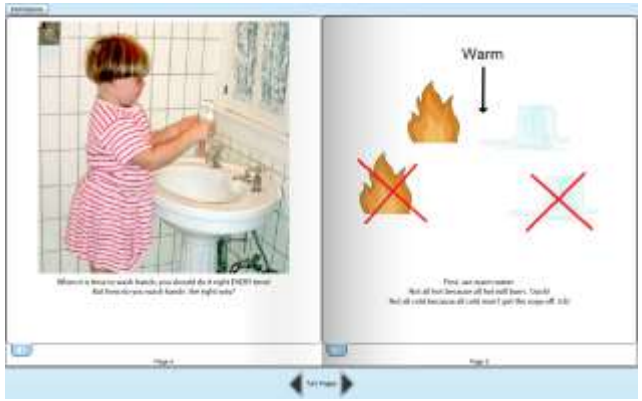
Story book creators, Play and imitation to facilitate word learning, social language tools,

Speech to text

http://www.youtube.com/watch?v=zRb3GguSRvY&feature=youtube_gdata_player

Customize a Story to help a Struggling Reader

VizZle 'Build-a-Book'
with option for multi-lingual natural audio and interactivity



Book Creation Apps
Construct your own iBook for kids to have familiar voice, video and images

Pictello, Speech Journal, ibook creator, Stories2learn

Communication through Storytelling: Learning Story Structure skills

- Listen and watch others 'tell' their story.
- Encourage students to tell their own.
- Reinforce digital story telling skills
- Pow!, Toontastic, StoryKit, StoryRobe, SonicPics, Idea Sketch

"Smories"

Toontastic

Simulation of Real Activities:
Helps multi-step comprehension

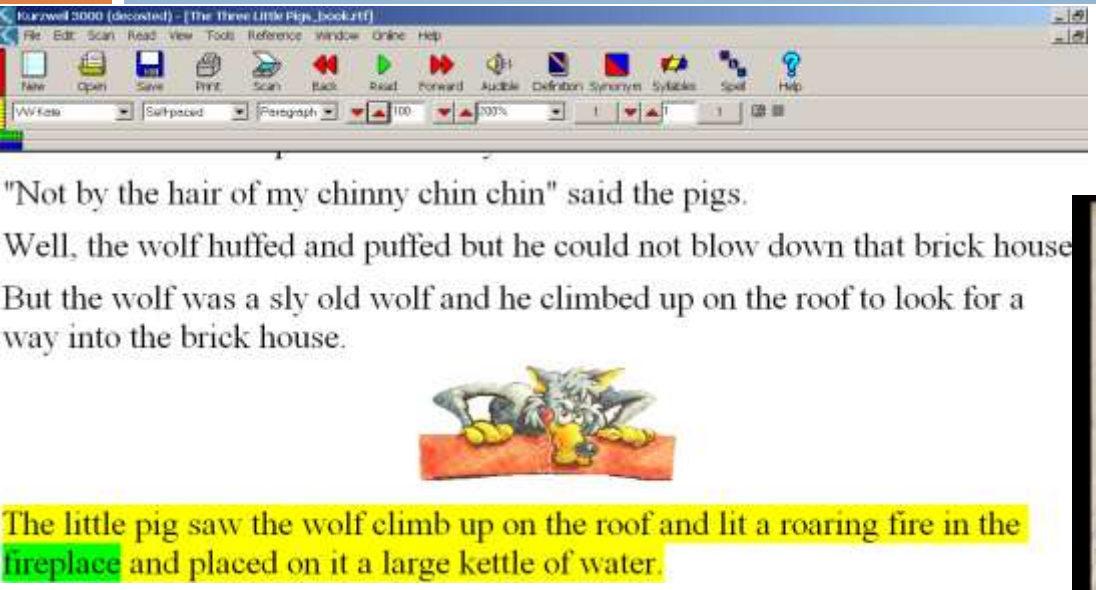
- Cookie or Cake Doodle
- Magnetic Alphabet, Scene Speak
  - allows 'play' on the iPod/iPad
  - word learning occurs in context
  - hear known voices

Scene Speak: Good Karma apps

Play/ Imitation Simulation apps

- Examples: myplayhome and playtheatre
- Interact with virtual characters
- Simulate multi-step activities

Reading Software



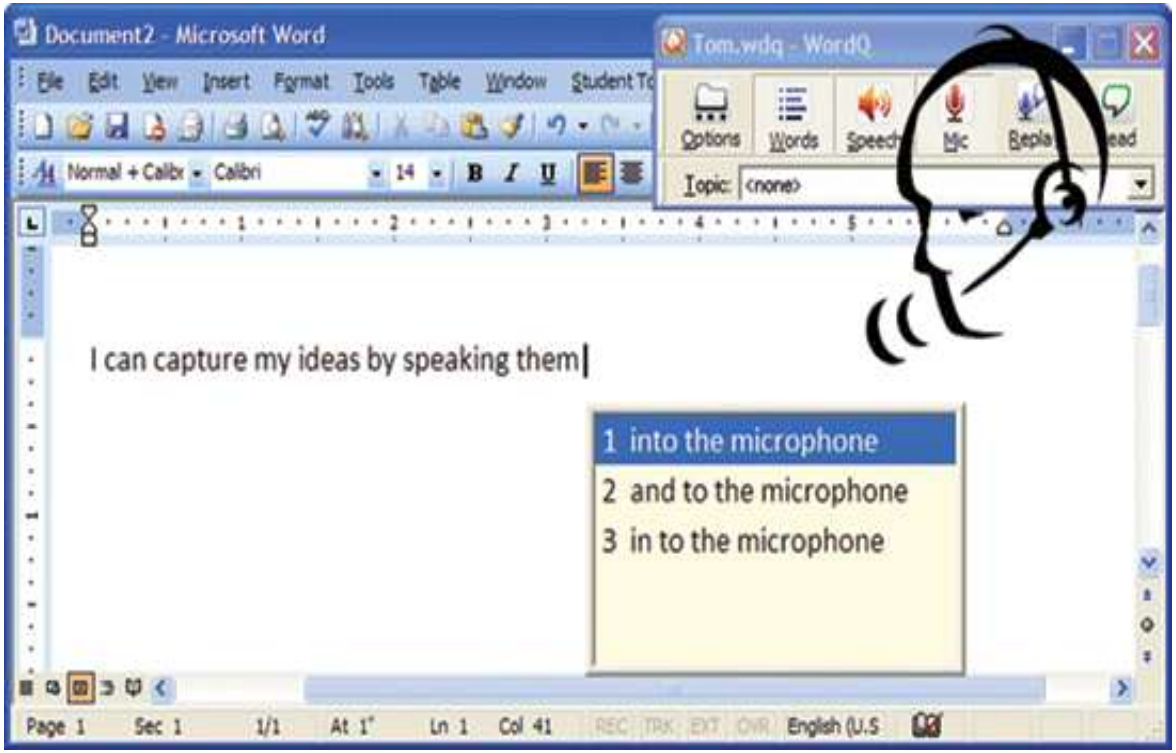
http://www.kurzweiledu.com/

http://www.donjohnston.com/products/start_to_finish/

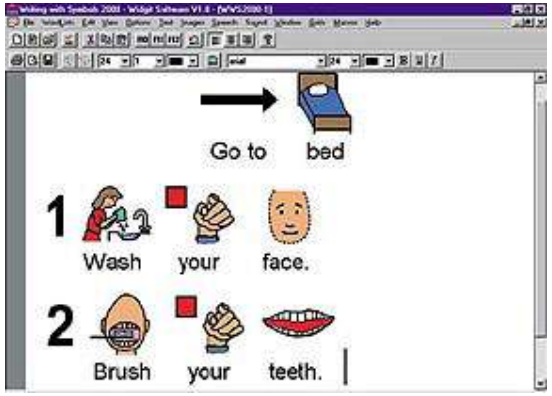
Writing

(dysgraphia, executive function impairment)

Remediation and Accommodation



Word Q and Speak Q by Intellisoft



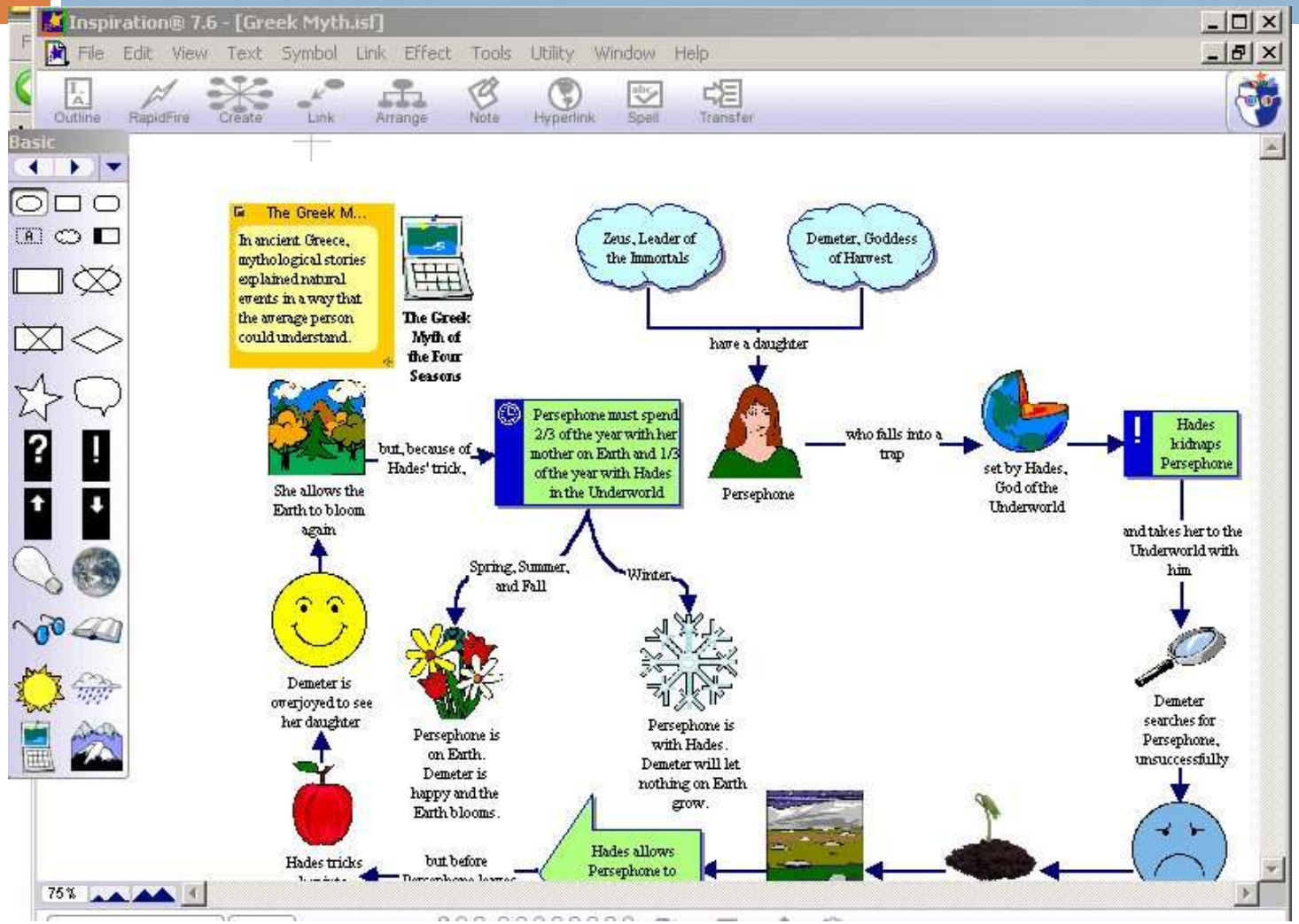
Writing With Symbols

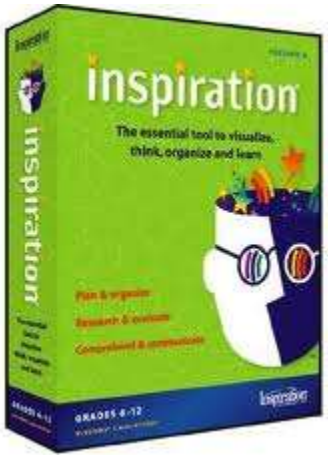
Text to Speech Software

And speech to text--see also Abilipad…under Behavior apps

Tools to Aid Thinking and Writing

("cause my head's going to explode with ideas")





In Writing view, pictures are Converted into hierarchical outline

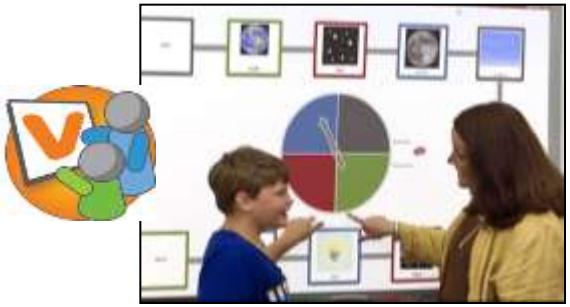
http://www.inspiration.com/Kidspiration

Emerging Technologies: "Forced Collaboration"

"Battochi, A. et al. 2010
"Collaborative Puzzle "

Facilitating Socialization, Interaction with Peers

- **VizZle game board**
  - Plays on Interactive Whiteboard, computer or Android or iPad tablet



- **Math and Word Bingo**
  - Rewards built in
  - Leveled activities

- **Eye Gaze and Social cue apps**

- **Talking Tom Ca**t and characters
  - Imitation and play

Social Games: Secret Agent

Secret Agent Society

- Randomized controlled trial showed greater improvements in social and emotional skills for Tx of control group (N=23 per group) after two month intervention.
- Social skills improved across contexts
- 76% improving from having clinically significant delays in social functioning to within the range of TD.
- Maintained gains five months after the program ended

www.sst-institute.net

Beaumont & Sofronoff, 2008

Addressing Sensory Issues

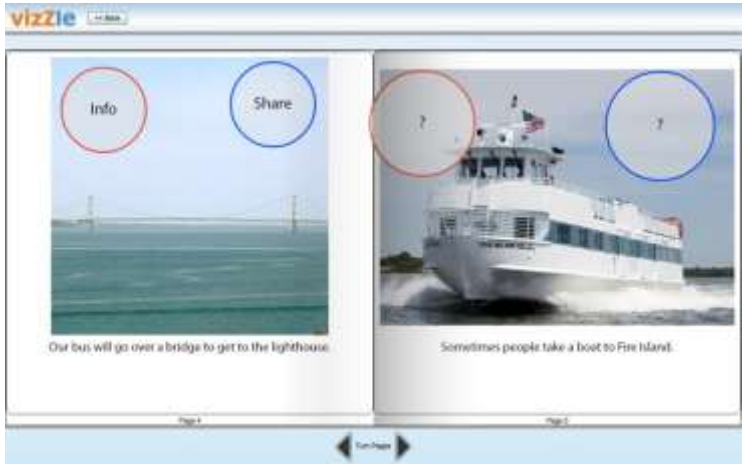
- Koi Pond (pocket pond)
- Fluidity, Spawn, Pyromania
- Relax Melodies, Nature Sound

UDL & Technology

Hotspots can :

- Pop up a movie providing more information
- Playback a voice recording, directions, explanations and more
- Provide a way to communicate and so much more!

Scene & Heard



Vizzle books

Accessibility Features

Zoom Magnification

White on Black Display

Mono Audio

Large Fonts

Closed-Captioned Support

VoiceOver Screen Reader

Audio & Visual Support for Instruction

External Add-Ons

(Stands, Switches, Bluetooth Keyboards, Earpieces, Styluses, Projectors)

SpEd Apps

(Proloquo2Go, Sign4Me, Dragon Dictation & so many more...)

The ipad gives a voice

ZacBrowser

What you (really) need to know.

Lawrence Summers (NYTimes, Jan 20, 2012)

1. Education will be **more about how to process and use information** and less about imparting it.
2. An inevitable consequence of the knowledge explosion is that tasks will be carried out with far **more collaboration.**
3. New technologies will profoundly alter the way knowledge is conveyed.

It's not too soon..

"A good rule of thumb for many things in life holds that things take longer to happen than you think they will, and then happen faster than you thought they could. "

Universal Design for Learning 'wordle'

“There’s an app for that!”™

Facial and Emotion Recognition

- Several studies now show improvement in face and/or emotion recognition using computer or DVD based training

- Difficulty in generalization to real settings. Often only limited generalization found
  - (LaCava et al 2007, 2010, Boelte et al 2002, Golan, Baron Cohen, 2006,2010)

For video of Face Say go to:
http://www.youtube.com/watch?v=UX-_ri7QBzo

Face Say

Amazing Gazing

Band Aid Clinic

Follow the Leader

Hopkins, Gower et al JADD 201

Iprompts